

Letter to the editor (please publish in entirety if at all) 6-1-83  
Robert Fabris:

In observing some of the Arcade games such as Donkey Kong, Satin's Hollow, and ~~Grand Prix~~ Turbo, I have concluded that what makes these games special is their extremely detailed background. Satin's Hollow, for example, has the appearance of a picture of a castle and cloudy skies. Most of the games produced for the Astrocade have very dull, simplistic backgrounds. Why? Because of hardware limitations, in that the largest program cassette can hold only 8K of ROM (for one reason) and arcade games often use 24K or more. In the home system 4080 bytes ~~4080~~ of ROM memory is required to entirely image map the screen. If a plug in cartridge could hold 36K bytes of ROM the entire screen could be mapped ~~several~~ up to 8 times still allowing for a sizeable program (4K) to bring in the eight entirely different, well-detailed background screens. Or a very long program up to 36K could be written for a very complex game. I have devised a ~~memory~~ bank-switched cartridge scheme that would allow a cartridge to hold a lower control block of 4K and an upper 4K block that could be switched to any of 8 4K ROM banks at the cost of ~~8~~ 8 of the ~~lower~~ 4K block's addresses. For really large programs the concept could be extended in additional 32K increments at the cost of 8 lower block bytes per increment. (Just repeat circuit with different Address logic).

The cost of switching banks timewise would be ~~the~~ the time it takes one Z80 memory referencing instruction to operate, as switching is accomplished by reading one of eight special addresses in the lower 4K of cassette ROM (e.g.  $2FF8_{16} - 2FFF_{16}$ ) by an instruction such as `LDA  $2FFF_{16}$`  (load accumulator ~~from~~ from location  $2FFF_{16}$ ), what is actually in the memory byte accessed is immaterial as it is never used; ~~only~~ the address itself conveys all information needed for the bank switch (implied addressing).

To display a background a sequence of instructions might be ~~assume~~ lower 2 banks switchable ROMs have screen

- (1) ~~load~~ `LDA  $2FF8H$`  ; select bank 0
- (2) `LXI H,  $3000H$`  ; start address of block move in ROM
- (3) `LXI D,  $4000H$`  ; screen ram
- (4) `LXI B,  $4080$`  ; number of bytes to move
- (5) `LDIR` ; transfer image from ROM to screen RAM.

These instructions would be issued from lower cassette ROM ( $2000H \rightarrow 2FF7H$ ).

To run program instructions in upper cassette (bank switchable) ROM, subroutine calls could be made to lower cassette ROM with arguments passed in Z80 registers:

- (1) ~~B~~ could contain 4 bit source of subroutine call bank number
  - (2) C could contain 4 bit destination bank number (for ROM screen image)
- ~~and~~ The lower ROM subroutine would;

- (1) MVI H, ~~0F~~<sup>2</sup> FH ; set upper 8 bit bank address
- (2) PUSH BC ; save parameters on stack
- (3) MVI A, 0F8H ; Prepare lower part of bank address
- (4) ORA C ; OR ~~in~~ destination bank number
- (5) MOV L, A ; Put lower part of bank address into L
- (6) ~~MOV~~ MOV A, M ; ~~ACCESS~~ Switch banks
- (7-10) (2-5 from previous example) ; Block transfer
- (11) POP BC ; Restore parameters from stack
- (12) MVI A, 0F8H ; Prepare lower part of bank address
- (13) ORA B ; OR in source bank number
- (14) MOV L, A ; Put lower part of bank address into L
- (15) MVI H, 2FH ; Put upper " " " " into H
- (16) MOV A, M ; switch banks
- (17) RET ; Return to calling program

The schematic of the cartridge hardware is shown in Figure 1. It uses only the signals presently available on the cassette connector so that no internal changes to Astracade are required. A prototype could be constructed using stacked chips extending outside the cartridge (Figure 2); however a better solution would be a hybrid 28 pin IC type package containing several silicon wafers (the latter would have to be done on large scale by someone such as Astravision; the former could be done on small scale by a small company).

I offer these ideas to anyone who is interested in the interest of

increasing the quality of Astrocade cartridge games. However, it would be nice if anyone marketting a cartridge(s) derived from ideas presented in this letter would give me a free copy(ies) of each game marketted.

Hope this is of some use to someone.  
Perhaps ~~Maybe~~ a Super Basic could be implemented with numerous canned graphic images.

Barry  
Barry McCleave  
109-B Timberlane Dr.  
Vicksburg, MS 39180

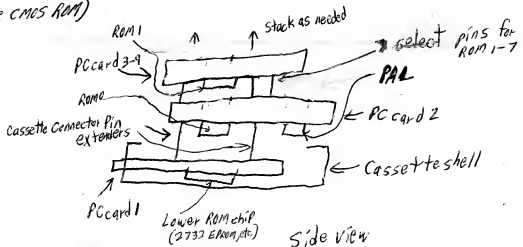
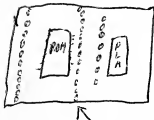
Enclosures: Fig. 1 & Fig. 2.

\* Note to assure Valid Address  
since no strobe available at  
cassette connector



Note: <sup>1</sup>rom chips are in standby while not selected with only 1 being active at a time so power is minimized (see further reduction use cmos ram)

Figure 2: Cartridge Prototype



Side view

Wire wrap IC socket pins  
for stacking in modular  
fashion

Note: could also run cable from dummy cartridge to external card

Robert Fabris  
3626 Merrie Dr.  
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Dear Bob:

3/24

You've finally hit my price range on the Bally Basic Videocade Cartridge, \$25. I am enclosing a check for \$25 for one cartridge. I will need complete documentation on the Bally cartridge; so, if it is not included in the \$25; please send your copy along (and I will Xerox it and mail it back to you immediately first class mail). If I like the Basic, I will probably resubscribe to the users group. I am also interested in getting bargains on the cassette interface and some of the game cartridges (such as, foot ball and space invaders). If no bargains are available I would like to know where to get these items at full price). I will be getting a Heath H89 in a few months & plan to interface it to the Bally. I also have a Prolog 280 board which I plan to remove the 280 & parallel (through the <sup>280</sup> socket on the Bally to get more Ram or EPROM since bus drivers are on board).

I still need assembly listings  
of the software within the Bally  
to fully utilize it if you have listings  
for sale (also a listing of Bally Basic would  
be nice).

Thank you.

Sincerely,

Barry M. McCleave

Barry McCleave

109-B Timber Lane Dr.

Vicksburg, MS 39180

P.S. I would also like to get spare parts  
on the special Bally/Midway chips  
that are not commonly available, if you  
have an address for such.

P.P.S. Since I am asking for a lot of your  
time to answer these questions, I  
am including as freebies, some material  
from introductory lectures I give from  
time to time at seminars (some of  
which might be good for some of your  
tutorials). I am not including the "Electronic  
Design" handout (it was just xeroxed from the  
Microprocessor Data Manual prepared once  
a year since 1977 in the magazine).